

Frequency Agile Seed Laser for Orbital Doppler-Shift Compensation, Phase I

Completed Technology Project (2018 - 2019)



Project Introduction

The overall goal of the SBIR effort is to develop a frequency-agile, stand-alone, space-hardened diode-based seed laser with options for locking and frequency agility to compensate for doppler shift during orbit. This US-manufactured platform will be applicable for seeding next generation Nd:YAG lasers currently being developed for high-priority-designated aerosol missions (single- and multi-channel backscatter), for Explorer missions for trace gas and methane sensing, as well as for future-looking Incubation missions. Under this Phase I effort, AdvR proposes to demonstrate the feasibility of programmable doppler-shift compensation for a compact, diode-based seed laser, as well as to provide a baseline design for a stand-alone, frequency agile, space-qualified system to be built and tested to TRL 6 by the end of the Phase II effort. This technology directly addresses the need for state-of-the-art lidar technology with an emphasis on compactness, efficiency, reliability, lifetime, and high performance, and will advance the accuracy of atmospheric space-based measurements, as described in the NASA SBIR topic **S.101 Lidar Remote Lidar Sensing Technologies**.

Anticipated Benefits

- 1) Aerosols/Clouds/Ecosystems Mission (ACE); NASA LaRC (Hostetler, Cook, et al.)
- 2) High Spectral Resolution Lidar (HSRL); Nasa LaRC (Hostetler, Cook, et al.)
- 3) Monitoring the Evolving State of Clouds and Aerosols (MESCAL); lidar mission concept under development by NASA LaRC and CNES
- 4) NASA Langley High Altitude Lidar Observatory (HALO)
- 5) Wind Lidar, NASA/GSFC (Gentry, et al.)
- 6) DIAL Lidar, NASA/GSFC (Riris, et al.)

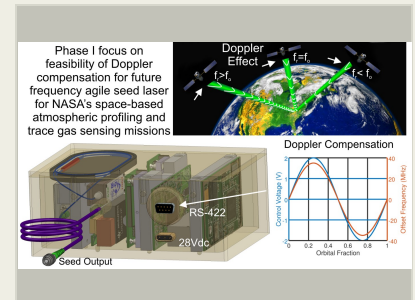
Laser source stabilization

Commercial lidar systems

Single frequency green lasers for underwater imaging

Environmental and pollution monitoring

Fiber and free-space communications



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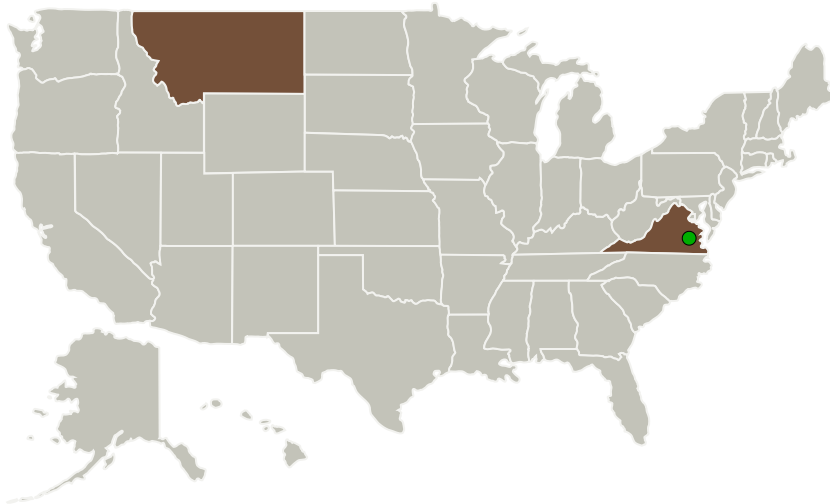
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
ADVR, Inc.	Lead Organization	Industry	Bozeman, Montana
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Montana	Virginia
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141061>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ADVR, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

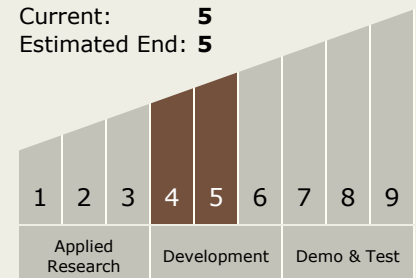
Carlos Torrez

Principal Investigator:

Shirley Mcneil

Technology Maturity (TRL)

Start: **4**
 Current: **5**
 Estimated End: **5**

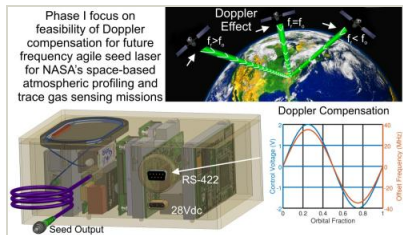


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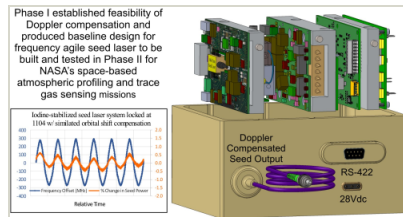


Images



Briefing Chart Image

Frequency Agile Seed Laser for Orbital Doppler-Shift Compensation, Phase I
(<https://techport.nasa.gov/image/129462>)



Final Summary Chart Image

Frequency Agile Seed Laser for Orbital Doppler-Shift Compensation, Phase I
(<https://techport.nasa.gov/image/134965>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destination

Earth